

# *After the Storm*



A Citizen's Guide to Understanding  
Stormwater Runoff and its Effects on  
Water Quality in the Roanoke Valley





## *What is Stormwater Runoff?*



Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater from naturally soaking into the ground.

## *Why is Stormwater Runoff a Problem?*



Stormwater can pick up debris, chemicals, dirt, and other pollutants and flow into a storm drain system or directly into water bodies such as Peters Creek, Mason Creek, Mudlick Creek, Wolf Creek, the Roanoke River, or Smith Mountain Lake. Anything that enters a storm drain system is discharged untreated into the water bodies and groundwater we use for swimming, fishing, and providing drinking water. Polluted stormwater runoff can seriously harm water quality.

## *The Effects of Pollution*



Polluted stormwater runoff can have many adverse effects on plants, fish, animals, and people.

- ◆ Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow. Sediment also can destroy aquatic habitats.
- ◆ Excess nutrients can cause algae blooms. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- ◆ Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- ◆ Debris—plastic bags, six-pack rings, bottles, and cigarette butts—washed into water bodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- ◆ Household hazardous wastes like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick or die from eating diseased fish and shellfish or ingesting polluted water.
- ◆ Polluted stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

The most recent National Water Quality Inventory reports that runoff from urbanized areas is the leading source of water quality impairments to surveyed estuaries and the third-largest source of impairments to surveyed lakes.

## *Flooding*

Did you know that because of impervious surfaces like pavement and rooftops, a typical city block generates more than five times more runoff than a woodland area of the same size?

In addition to its effects on pollution, increased impervious surface from development can increase the risk of flooding. What is your flood risk? Your community officials or local emergency management office are your best resources to learn about the history of flooding for your region (see contact information on the last page). Ask whether your property is in the floodplain and if it is above or below the flood stage water level. Flood Insurance Rate Maps (FIRMs) are used to determine your flood risk. FIRMs are found in several places for your convenience:



- ◆ Your local community map repository, usually, the engineering or planning department.
- ◆ The FEMA Map Store for maps, flood studies, and other products on-line or paper copies. [www.store.msc.fema.gov](http://www.store.msc.fema.gov)
- ◆ Call a Map Specialist for specific questions about your flood zone at 1.877.336.2627.





# Stormwater Pollution Solutions



## Residential

Recycle or properly dispose of household products that contain chemicals, such as insecticides, pesticides, paint, solvents, and used motor oil and other auto fluids. Don't pour them onto the ground or into storm drains.



### Lawn Care

Excess fertilizers and pesticides applied to lawns and gardens wash off and pollute streams. In addition, yard clippings and leaves can wash into storm drains and contribute nutrients and organic matter to streams.

- ◆ Don't overwater your lawn. Consider using a soaker hose instead of a sprinkler.
- ◆ Use pesticides and fertilizers sparingly. When use is necessary, use these chemicals in the recommended amounts. Use organic mulch or safer pest control methods whenever possible.
- ◆ Compost or mulch yard waste. Don't leave it in the street or sweep it into storm drains or streams.
- ◆ Cover piles of dirt or mulch being used in landscaping projects.



### Septic Systems

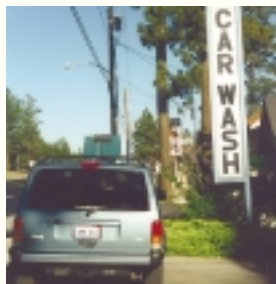
Leaking and poorly maintained septic systems release nutrients and pathogens (bacteria and viruses) that can be picked up by stormwater and discharged into nearby water bodies. Pathogens can cause public health problems and environmental concerns.

- ◆ Inspect your system every three years and pump your tank as necessary (every three to five years).
- ◆ Don't dispose of household hazardous waste in sinks or toilets.

### Auto Care

Washing your car and degreasing auto parts at home can send detergents and other contaminants through the storm drain system. Dumping automotive fluids into storm drains has the same result as dumping the materials directly into a water body.

- ◆ Use a commercial car wash that treats or recycles its wastewater, or wash your car on your yard so the water infiltrates into the ground.
- ◆ Repair leaks and dispose of used auto fluids and batteries at designated drop-off or recycling locations.



### Pet Waste

Pet waste can be a major source of bacteria and excess nutrients in local waters.

- ◆ When walking your pet, remember to pick up the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local water bodies.



Education is essential to changing people's behavior. Signs and markers near storm drains warn residents that pollutants entering the drains will be carried untreated into a local water body.

## Residential Landscaping

**Permeable Pavement**—Traditional concrete and asphalt don't allow water to soak into the ground. Instead these surfaces rely on storm drains to divert unwanted water. Permeable pavement systems allow rain and snowmelt to soak through, decreasing stormwater runoff.

**Rain Barrels**—You can collect rainwater from rooftops in mosquitoproof containers. The water can be used later on lawn or garden areas.

**Rain Gardens and Grassy Swales**—Specially designed areas planted with native plants can provide natural places for rainwater to collect and soak into the ground.

Rain from rooftop areas or paved areas can be diverted into these areas rather than into storm drains.

**Vegetated Filter Strips**—Filter strips are areas of native grass or plants created along roadways or streams. They trap the pollutants stormwater picks up as it flows across driveways and streets.



## Commercial

Dirt, oil, and debris that collect in parking lots and paved areas can be washed into the storm drain system and eventually enter local water bodies.

- ◆ Sweep up litter and debris from sidewalks, driveways and parking lots, especially around storm drains.
- ◆ Cover grease storage and dumpsters and keep them clean to avoid leaks.
- ◆ Report any chemical spill to the local hazardous waste cleanup team. They'll know the best way to keep spills from harming the environment.







## Agriculture

Lack of vegetation on streambanks can lead to erosion. Overgrazed pastures can also contribute excessive amounts of sediment to local water bodies. Excess fertilizers and pesticides can poison aquatic animals and lead to destructive algae blooms. Livestock in streams can contaminate waterways with bacteria, making them unsafe for human contact.

- ◆ Keep livestock away from streambanks and provide them a water source away from water bodies.
- ◆ Store and apply manure away from water bodies and in accordance with a nutrient management plan.
- ◆ Vegetate riparian areas along waterways.
- ◆ Rotate animal grazing to prevent soil erosion in fields.
- ◆ Apply fertilizers and pesticides according to label instructions to save money and minimize pollution.

## Forestry

Improperly managed logging operations can result in erosion and sedimentation.

- ◆ Conduct preharvest planning to prevent erosion and lower costs.
- ◆ Use logging methods and equipment that minimize soil disturbance.
- ◆ Plan and design skid trails, yard areas, and truck access roads to minimize stream crossings and avoid disturbing the forest floor.
- ◆ Construct stream crossings so that they minimize erosion and physical changes to streams.
- ◆ Expedite revegetation of cleared areas.



## Construction

Erosion controls that aren't maintained can cause excessive amounts of sediment and debris to be carried into the stormwater system. Construction vehicles can leak fuel, oil, and other harmful fluids that can be picked up by stormwater and deposited into local water bodies.

- ◆ Divert stormwater away from disturbed or exposed areas of the construction site.
- ◆ Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment and erosion controls and properly maintain them, especially after rainstorms.
- ◆ Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.



## Automotive Facilities

Uncovered fueling stations allow spills to be washed into storm drains. Cars waiting to be repaired can leak fuel, oil, and other harmful fluids that can be picked up by stormwater.

- ◆ Clean up spills immediately and properly dispose of cleanup materials.
- ◆ Provide cover over fueling stations and design or retrofit facilities for spill containment.
- ◆ Properly maintain fleet vehicles to prevent oil, gas, and other discharges from being washed into local water bodies.
- ◆ Install and maintain oil/water separators.



For more information contact:

City of Roanoke  
Office of Environmental and Emergency Management  
540-853-2425  
eem@ci.roanoke.va.us  
[www.roanokegov.com](http://www.roanokegov.com)

Town of Vinton  
Curtis Shumate, Director of Public Works  
[cshumate@town.vinton.va.us](mailto:cshumate@town.vinton.va.us)  
540-983-0646  
[www.town.vinton.va.us](http://www.town.vinton.va.us)

County of Roanoke  
Department of Community Development  
540-772-2065  
[www.co.roanoke.va.us](http://www.co.roanoke.va.us)

or visit [www.epa.gov/npdes/stormwater](http://www.epa.gov/npdes/stormwater)  
[www.epa.gov/nps](http://www.epa.gov/nps)



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